PART E

PRELIMINARY CLOSURE AND POST-CLOSURE MAINTENANCE PLAN

SECTION E.1

CLOSURE PLAN

E.1 CLOSURE PLAN

E.1.1 INTRODUCTION AND PURPOSE

Closure of the GCLF will be performed in accordance with the applicable regulatory standards included in 27 CCR, Chapters 3 and 4 and 40 CFR, Subpart F. The purpose of Part E is to develop sufficient information regarding the proposed closure design and post-closure maintenance to estimate the associated costs presented in Part F. The estimated costs will then become the basis for properly funding GCLF's closure and post-closure maintenance account.

The components and systems required for closure of the GCLF include the final grading, final cover design, drainage and erosion control systems, landfill gas monitoring/control system, leachate control system (including modification), site security, and structure removal of environmental control systems (during final cover placement). A description of these closure components as well as a schedule for construction of the GCLF closure improvements is presented in the following subsections.

E.1.2 FINAL GRADING

This section describes the final grading contours for the GCLF. General construction procedures will be utilized to promote lateral run-off of surface water and minimize the effects of settlement. Perimeter maintenance and deck access roads will be used to maintain the final cover and environmental control systems throughout the post-closure maintenance period. Topographic information, dated 1991, has been utilized to create the base map for the final grading plan and other closure design plans.

The final grading plan (Figure 9) shows that the maximum elevation of the landfill, including the final cover system, will be 1,100 feet amsl. The final deck area will have a minimum grade of three percent to promote drainage and allow for future settlement. Minor filling changes and shaping of the proposed final contours may be conducted during closure construction to maintain the

minimum design gradients and promote lateral run-off of precipitation based on actual field conditions present at the end of active disposal operations.

The final landfill slopes will be designed with an overall gradient of approximately 3.5:1. The benches will be 20 feet wide placed approximately every 40 vertical feet, sloped inward at approximately six percent and have an overall horizontal gradient of three percent in order to convey storm water to the bench downdrain inlets and/or perimeter drainage channels.

The final grading configuration was designed and approved by a registered civil engineer in accordance with 27 CCR, Section 21090 (b)(1)(C).

E.1.3 FINAL COVER

The purpose of a final cover is to provide long-term minimization of surface water intrusion, to isolate wastes from the ground surface, and to reduce the potential for odors and gas emissions. The cover also provides a base for vegetation, which will reduce drainage velocities and erosion. In addition, the final cover configuration is designed to accommodate settlement, subsidence and the effects of seismic events throughout the minimum 30-year post-closure maintenance period and beyond.

E.1.3.1 FINAL COVER DESIGN

E.1.3.1.1 REGULATORY DESIGN STANDARDS

California Final Cover Prescriptive Design Standard

The minimum final cover standards for the GCLF, as outlined in the closure and post-closure requirements for Class III landfills contained in 27 CCR, Section 21090 include:

- Foundation Layer: A minimum two-foot thick layer of soil placed immediately over the entire surface of the last lift of refuse. This layer shall have the appropriate engineering properties, so as to provide a relatively unyielding surface upon which to place and compact the low-hydraulic-conductivity layer.

- Low-Hydraulic-Conductivity Layer: A minimum one-foot thick layer of clean low-hydraulic-conductivity soil containing no waste or leachate placed over the foundation layer. The low-hydraulic-conductivity (or low through-flow rate) soils shall be placed on top of the foundation layer and compacted to attain a hydraulic conductivity, which is the lesser of either;

  - 1×10^{-6} cm/sec.
  - The hydraulic conductivity of any bottom liner system or underlying natural geologic materials.

- Erosion Resistant Layer: A minimum one-foot thick layer of soil containing no waste or leachate placed on top of all portions of the low-hydraulic conductivity layer. Vegetation root depths must not exceed the topsoil layer thickness. Vegetation is to be replanted, as needed, to provide effective erosion resistance.

The final cover should be designed to allow for minimal maintenance. The final grading design for areas flatter than 5:1 (horizontal:vertical) shall have a gradient of at least three percent, to prevent ponding and accommodate settlement.

Federal Final Cover Prescriptive Design Standard

The minimum final cover standards for the GCLF, as outlined in the closure criteria of 40 CFR, Subpart F, Section 258.60, include:

- A cover with a permeability less than or equal to the hydraulic-conductivity of any bottom liner system or natural sub-soils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less. The infiltration layer shall consist of a minimum 18 inches of earthen material.
- A cover which minimizes erosion of the final cover by the use of an erosion resistant layer that contains a minimum six inches of earthen material and is capable of sustaining native plant growth.

E.1.3.1.2 FINAL COVER DESIGN

Several factors were taken into consideration in establishing the final cover design for the GCLF including the overall geometry of the landfill, the composite liner design, local climatic conditions (i.e., semi-arid environment, low rainfall, high evaporation rate), potential landfill settlement, final cover performance, erosion protection, vegetative growth and end use at closure.

Based on these site conditions and the regulatory requirements discussed above, it was determined that a final cover design utilizing a 60-mil linear low-density polyethylene (LLDPE) geomembrane as the barrier layer component of the final cover system would be necessary for the GCLF.

Therefore, the overall final cover design for the GCLF will consist of the following: a minimum two-foot thick foundation layer composed of random soil materials, a barrier layer consisting of a synthetic cover (i.e., a 60-mil LLDPE geomembrane); a HDPE drainage geocomposite layer (on the deck areas only); and a two-foot vegetative layer of random soils. A typical cross-section of the final cover system (deck and slope areas) is shown on Figure 31.

An alternative to the prescriptive final cover system may be considered at a later time, as allowed for in 40 CFR 258.60.

E.1.3.1.3 FINAL COVER STABILITY

An evaluation of the stability of the final cover design for the GCLF was performed and is included in Appendix C. For this stability analysis, the interface between the LLDPE geomembrane and the overlying vegetative soil cover was considered as the critical surface. The factors considered and used in the analysis included the thickness of the vegetative soil layer, total density of the soil in the vegetative layer, angle of internal friction at the interface between soil and LLDPE geomembrane, and maximum ground acceleration for the postulated maximum credible earthquake (MCE) at the site. The slope stability analysis was conducted considering the final cover as a semi-infinite slope with a gradient of 3:1.

The analysis indicated a static factor of safety of 1.5 and a pseudo-static factor of safety of 0.96 using a seismic coefficient of 0.15. Since the pseudo-static factor of safety was less than 1.5, an additional analysis was made to estimate the seismic induced permanent displacement during the postulated seismic exposure of the site. Using the Bray and Rathje (1998) procedure, the seismic displacement under the loading of the MCE is estimated at approximately three inches. This amount of displacement will not impair the functional integrity of the final cover. The affects from a seismic event on the final cover can be easily repaired as a part of post-earthquake maintenance.

E.1.3.1.4 FINAL COVER CONSTRUCTION

Clearing and Grubbing

Prior to final grading and placement of the final cover, all existing vegetative materials will be removed from the foundation surface without disturbing the underlying refuse. All materials generated by the clearing and grubbing operation will be disposed of in the refuse area and covered with a minimum of two feet of foundation layer material.

Foundation Layer

Foundation layer soils will be added in those areas of the refuse footprint which contain interim cover material with a total depth of less than two feet. The thickness of interim cover for the refuse area will be evaluated, as necessary, by potholing prior to closure. The foundation layer will be compacted in accordance with the CQA Plan included in Appendix M. The foundation layer material on the deck area will be graded to a minimum slope of three percent.

For purposes of cost estimating, one foot of cover soils have been assumed to be in-place at the time of closure. Adjustments during foundation layer grading will be made, as necessary, based on the results of the existing cover depth evaluation.

Barrier Layer

The barrier layer for the GCLF will consist of a 60-mil LLDPE geomembrane. The geomembrane will be overlain in deck areas by a geocomposite drainage layer (e.g., geonet) designed to convey liquids, which may build up over the geomembrane. The geonet is sandwiched between two layers of non-woven geotextile. The geonet will facilitate lateral drainage of any water accumulating over the LLDPE.

Vegetative Layer

Vegetative Cover

The vegetative cover will consist of a minimum two-foot thick soil layer placed in accordance with the CQA Plan (Appendix M). Vegetative materials to be planted in the cover will be selected to fulfill two important functions: erosion and moisture control. Plants selected for the cover must exhibit suitable erosion control characteristics such as spreading roots, fast growth, adequate soil coverage and long lasting/self propagating reproduction patterns. Other physical characteristics required by 27 CCR, Section 21090 (a)(3) include low maintenance and low water demand.

The final vegetative cover will be comprised of plant and grass species native to the region of the landfill site. Plant species selected as the final vegetative cover will adapt to a non-irrigated environment and will maintain beneficial erosion control and aesthetic characteristics within the local climatic environment. The installation of the vegetative cover will normally occur in the fall, prior to the seasonal growing period. All vegetative cover plants will be seeded. Generally, the seeding process includes two installation methodologies, drill-seeding and/or hydro-mulching. The drill seeding method occurs on all accessible areas with a final slope gradient of 3:1 or less. Drill-seeding applies seed in direct contact with the vegetative cover soil and requires no water during installation. Hydro-mulching applies the seed, fertilizer, fiber (mulch), water and tackifier (soil stabilizer) to the surface of the vegetative cover. The hydro-mulching process will occur in two steps. The first application applies the seed, fertilizer, and a small amount of fiber onto the soil surface. The second application covers the seed with the tackifier and a heavy mulch layer to insulate the seed layer.

When established, the vegetative cover will appear as a low-profile fine- (grasses) to medium-textured (shrubs) vegetative open space, similar to adjacent natural areas. Plant species will include native seasonal grasses, legumes, wildflowers, and low growing perennial shrubs. This combination of plant species will provide for an uneven distribution of roots without penetrating beyond the overall depth of the vegetative layer. Plant species utilized at the site after closure will be consistent with the non-irrigated open space end use.

E.1.4 LANDFILL SETTLEMENT

E.1.4.1 SETTLEMENT ANALYSIS

This section describes the method of analysis used to estimate the total potential refuse settlement that may occur at the GCLF during the post-closure period. Three principal settlement mechanisms exist for a typical municipal waste landfill: consolidation induced settlement resulting from the loss of fluids from the refuse prism; shrinkage related settlement occurring as a result of biochemical decomposition such as fermentation and decay; and compaction related settlement resulting from the reorientation of solids into a more dense configuration. In addition to these "classic" settlement mechanisms, dynamic settlement can occur during and shortly after earthquake events, when soil and/or refuse particles may densify as a result of shaking.

It is theoretically possible to quantify the settlement expected to result from each of the phenomena described above. However, the data available for the GCLF, and, in fact, virtually all landfills, are insufficient to make a site-specific analysis. Therefore, the analysis presented herein is subjective and based on historic settlement ranges for existing landfills in Southern California.

Conclusions presented by Hagerty, Pavoni and Hur (1973) and the Los Angeles County Sanitation Districts (Huitric, 1981) indicate that recorded landfill settlements are typically up to 40 percent of original refuse thickness. This compares well with a general "Rule of Thumb" in the profession suggesting an approximate 20 to 30 percent volume loss. For the purposes of this analysis, a 30 percent total settlement occurring logarithmically over an approximate 30-year period was considered to be a conservative assumption.

The most consistent refuse settlement estimates are obtained by modeling the refuse prism as a three-dimensional net, calculating the settlement at each node with a time-dependent exponential decay function and adding the total settlement for each node of the net. Total settlement contours are then generated by subtracting total settlement from the proposed final grades.

To estimate the historical rates of refuse accumulation, a two-dimensional grid was established over the footprint of the refuse prisms, with a nodal spacing of 250 feet. The third dimension in the model net was then the net change in elevation between discrete time intervals, as determined from the fill phasing plans. Each layer of the model represented three to four years of landfill operation.

Figures 32A and 32B shows the landfill surface elevations at the time of landfill closure, and the estimated landfill elevations 10, 20, and 30 years after closure. As also shown on Figure 32B, total potential settlement after 30 years might be as much as 60 feet in the southern half of the landfill prism, where, at closure, the landfill is the thickest. Because the final configuration of the landfill is expected to vary over time, the proposed final grading design, combined with the cover maintenance procedures, was developed to accommodate the estimated settlement. The settlement analysis performed on the GCLF is included in Appendix C.

E.1.4.2 SURVEY/SETTLEMENT MONUMENTATION

In order to monitor the future settlement of the landfill, survey monuments will be installed on the landfill in accordance with 27 CCR, Section 20950 (d). These monuments are proposed to consist of galvanized pipe, two inches in diameter and six inches in length placed in blocks of concrete, 24-inches in diameter by eight inches in depth. A nail and tag will be placed in the center of each monument for identification.

Two settlement monuments and two permanent survey monuments will be placed on the landfill area in accordance with 27 CCR, Section 20950. These monuments will provide both horizontal and vertical control points by which to monitor settlement of the final fill contours throughout the post-closure maintenance period. The locations proposed for the monuments are shown on Figure 9. In addition, an aerial photographic survey of the GCLF will be performed and provided to the RWQCB, LEA, and the CIWMB upon completion of closure activities in accordance with 27 CCR, Section 21090 (e)(1). The settlement monuments will be surveyed upon completion of all closure construction activities. In accordance with 27 CCR, Section 21090(e)(2), the operator will prepare an iso-

settlement map of the entire permitted site every five years throughout the post-closure maintenance period.

E.1.5 CLOSED LANDFILL STABILITY

A slope stability analysis is required by 27 CCR, Section 21090 when the closure design includes final slope faces steeper than 3:1 (horizontal to vertical) or a synthetic component in the final cover configuration. The proposed final slopes for the GCLF do not exceed 3:1 but, the final cover design includes a barrier layer which consists of a synthetic component (e.g., LLDPE). Therefore, a slope stability analysis was conducted pursuant to 27 CCR, Section 21750(f)(5) to review the integrity of final slopes under both static and dynamic conditions. The results of the slope stability analysis are included in Appendix C.

E.1.6 CONSTRUCTION QUALITY ASSURANCE (CQA)

The construction of the final cover system shall be carried out in accordance with a CQA Plan prepared in compliance with 27 CCR, Sections 20323 and 20324, which has been certified by an appropriately registered engineer or a certified engineering geologist. The CQA Plan will provide evidence that suitable materials and standard construction practices are used to place the final cover system and to document that placement is consistent with the closure plan design specifications in 27 CCR, Section 20324. A CQA Plan reflecting the final cover design for the GCLF has been developed and included as Appendix M. This plan reflects typical CQA procedures necessary to document the construction of the final cover system for purposes of estimating the associated cost. This plan will be updated, if necessary, if a closure design change is made and/or when the final closure plan is prepared. Elements of the CQA Plan include: project description and definitions, qualifications and responsibilities, requirements for the final cover evaluation, inspection standards, testing frequencies, meetings and documentation.

E.1.7 DRAINAGE AND EROSION CONTROL

E.1.7.1 DRAINAGE CONTROL SYSTEM DESIGN

The primary function of the GCLF drainage control system is to collect and convey stormwater in a controlled manner to minimize erosion and to inhibit infiltration of stormwater or precipitation into the refuse prism. The following sections describe the site hydrology and the drainage control features.

E.1.7.1.1 HYDROLOGY

A hydrology study for the proposed conditions at the site was conducted in accordance with 27 CCR, Section 20365. The objective of the hydrology study was to calculate stormwater run-off for sizing and location information related to the site's storm drain facilities at closure.

The 2003 version of the San Diego County Hydrology Manual and Rational Method of Hydrology were used to calculate peak discharge rates for a 24-hour, 100-year storm event. A computer program developed by Advanced Engineering Software was used to compute the run-off. The hydrology study map indicating drainage sub-areas and discharge points and calculations for on-site and off-site flows are shown on Figure 18. A hydrology/hydraulics analysis is included as Appendix I and additional hydrology information is presented in Section C.2.8.2.

E.1.7.1.2 FINAL DRAINAGE CONTROL SYSTEM

The final drainage control system for the GCLF is shown on Figure 17. The final surface area of the landfill decks will be graded at a minimum three percent gradient to prevent ponding and promote lateral runoff.

The final drainage control system will include exterior slope downdrains, engineered deck area gradients and drainage berms, deck inlets, bench drains and inlets, buried drain pipes, trapezoidal channels, and two desilting basins. Some of the interim drainage control features may be utilized as part of the final drainage control system for the site. For additional drainage control details, refer to Section C.2.8.

E.1.7.2 SOIL LOSS ANALYSIS

The Universal Soil Loss Equation (USLE) was used to evaluate potential soil losses within the watershed boundary of the GCLF site both in a pre-development condition and after closure throughout the post-closure maintenance period. The USLE was intended for analysis of meadows and cropland soil loss. However, with certain engineered assumptions, it can be applied to soil cover over landfills.

The USLE is:

$$A = RKLSCP$$

where
- A = average soil loss, in tons/acre
- R = rainfall and run-off erosivity index
- K = soil erodibility factor, tons/acre
- L = slope-length factor
- S = slope-steepness factor
- C = cover-management factor
- P = practice factor

The soil loss analysis performed is based on a "closed landfill" condition. At closure, the potential soil loss is minimal because the landfill will have a compacted final cover, an erosion control surface of vegetation and a storm drain system installed which all contribute to controlling soil erosion.

The following USLE constants were utilized:

R = 50	Value for Southern California
K = 0.26	Soil Erodibility
LS = 8.0	Dependent upon length gradient
C = 0.03	Based on vegetative material
P = 0.60	Practice factor

For the purpose of the soil loss analysis, the landfill was divided into regions based upon the average slopes of the final grades and surface drainage. The average soil loss for the GCLF is 1.9 tons/acre/year, which is below the two tons/acre/year allowed by the CIWMB. Over the 30-year post-closure maintenance period, the average soil loss over the entire site will be approximately 0.31 inches. The 30-year soil loss represents 0.7 percent of the

total final cover thickness. The landfill soil loss analysis data is presented in Appendix L. The soil loss analysis map is shown in Figure 27.

As mentioned above, a soil loss analysis was prepared to estimate the loss of soil that might occur under ambient (pre-development) conditions (see Appendix L). Based on the results of the second analysis, the soil for the existing, pre-development condition was determined to be approximately four tons/acre/year. This is approximately twice the calculated soil loss for the closed landfill condition.

E.1.7.3 EROSION CONTROL

The landfill closure design has three primary erosion control features that will reduce the potential for soil erosion due to water and wind. These features include fill area grading, vegetation, and a slope bench system.

The decks will be graded for sheet flow run-off with a minimum gradient of approximately three percent. The final vegetative cover and borrow site will be comprised of plant species native to the GCLF area. Plant species for erosion control will adapt to a non-irrigated environment and will maintain beneficial erosion control and aesthetic characteristics within the local climatic environment.

Closure construction BMPs (i.e., straw wattle, coir logs, sand bags, etc.) will be utilized until vegetation is re-established.

The slope benches and/or access roads will be placed at 40-foot vertical intervals on the landfill slope. The final slope bench system will reduce the length of travel of run-off on the slope face thus reducing the opportunity for rilling and gullying.

E.1.8 GAS CONTROL AND MONITORING SYSTEMS

The purpose and intent of gas monitoring during closure and post-closure is to protect public health and safety and the environment. The installation and operation of the GCLF gas migration monitoring system will be in accordance

with 27 CCR, Section 20920 and will be completed prior to closure. Sections B.5.2 and C.2.7 provide information regarding the landfill gas control systems. The system will be taken off line in stages as the final cover is constructed. The vertical well head(s) will be extended to accommodate the final cover thickness and synthetic boots will be installed around the well heads and welded to the synthetic barrier layer. The header system will be reinstalled and well heads reconnected to bring the system back on-line.

E.1.9 LIQUIDS MANAGEMENT SYSTEMS

The liquids management systems are described in Section C.2.5. All of these systems will be in-place at closure and maintained throughout the post-closure period.

E.1.9.1 LCRS

The containment system design for the GCLF includes a LCRS above the liner to collect and convey leachate that may be generated within the refuse prism. The LCRS has been designed on the basis of maximum anticipated leachate generation for the disposal area. The general LCRS design will consist of a granular drainage blanket constructed immediately above the liner in the bottom liner areas. A network of leachate collection pipes placed within the granular drainage blanket will convey accumulated fluid by gravity flow to the mouth of the canyon to be discharged into two double-walled collection tanks. This system will be in-place at closure and maintained throughout the post-closure period. The LCRS design over slope liner areas consists of gravel pipe collectors wrapped with a geotextile filter fabric placed on the interior benches along the slopes. For details of the LCRS, refer to Sections B.5.1.1 and C.2.5.

E.1.9.2 SUBDRAIN SYSTEM

Even though the GCLF bottom grades are a minimum of five feet above the piezometer surface and therefore, groundwater is not anticipated, a subdrain system is proposed to be constructed beneath the GCLF waste containment system. The subdrain system will collect and control any groundwater, if it intersects the subgrade excavation along the bottom and/or side slopes.

The subdrain system for the GCLF will be placed beneath the composite liner and will consist of a one-foot thick gravel blanket and gravel filled trenches with slotted collector pipes in the bottom areas. The floor subdrain system is a redundant system in which the permeable gravel pack and the pipe can both convey over a million gallons of water per day. A geotextile layer separates the gravel layer from the low-permeability soil layer on the landfill floor. This geotextile layer prevents the floor subdrain from clogging.

Although groundwater seeping into the subgrade excavation is not anticipated, if it occurs, it will be collected in the subdrain system and will gravity drain to a single collection point at the toe of the landfill. If present, the subdrain system discharge will be monitored for contamination in accordance with the WDR parameters. Any contaminated water will be treated at the landfill by the on-site RO system, other groundwater treatment as discussed in B.5.1.8, or transported to an appropriate off-site disposal facility. The subdrain system is further described in Section C.2.3.

E.1.9.3 GROUNDWATER TREATMENT SYSTEM

The agreement between the San Luis Rey Municipal Water District and the applicant requires the installation of an RO system. The RO system will be installed in the southwestern portion of the ancillary facilities area. The purpose of the RO system is to provide a groundwater treatment facility that is in place in the event of groundwater contamination. For details on the RO system as well as the GAC system for contaminated groundwater treatment, refer to Section B.5.1.8.

E.1.10 SITE SECURITY/SIGNAGE

A perimeter fence and gates, and topographic features will provide site security at the GCLF. In accordance with 27 CCR, Section 21135, signs will be posted at all points of access to the GCLF 60 days prior to the last receipt of waste at the site and for a period not less than 180 days after the facility has received the final shipment of waste. Signs will state the intended date of last receipt, the site and location of alternative solid waste management facilities and a number to call in case of emergency. A notice shall be placed in a local newspaper 30 days prior

to the last receipt of waste, including the intended date of the last receipt of waste at the site and the location of alternative solid waste management facilities.

In accordance with 27 CCR, Section 21135, all points of access to the site will be restricted as of the date of the final shipment of waste. The operator will secure all points of access with a lock and gate and place signs at all access points prohibiting unauthorized entry. These measures are intended to reduce incidents of vandalism and illegal disposal of wastes during the post-closure maintenance period.

E.1.11 STRUCTURE REMOVAL/DECOMMISSIONING OF ENVIRONMENTAL CONTROL SYSTEMS

Site structures not deemed essential for closure construction or post-closure maintenance will be dismantled and removed in accordance with 27 CCR, Section 21137. For the GCLF, these structures include the scales and scalehouse, maintenance building and administration/visitor center.

All structures and foundations will be demolished and properly disposed of at the site. Scale pits and excavations remaining from demolished foundations will be backfilled with inert soils and compacted. The scales and associated mechanisms, office supplies and computer equipment for the scalehouse will be removed and salvaged.

At this time, there are no plans to decommission any of the proposed environmental control systems at the GCLF at closure or throughout the post-closure maintenance period. If deemed necessary, any decommissioning of boreholes, monitoring wells or piezometers will be conducted in accordance with the appropriate regulatory agency requirements (including notifications, as required) and in general accordance with post-closure maintenance plan procedures.

E.1.12 CLOSURE IMPLEMENTATION SCHEDULE

E.1.12.1 CLOSURE PROCESS

A closure implementation schedule for the GCLF is presented in Table 13, which delineates the estimated time frame to complete each closure task described in this PCPCMP.

Closure construction will begin with mobilization of equipment and materials. The type of equipment and required personnel expected to be utilized during closure construction includes but is not limited to, the following:

- Equipment
  - Scrapers
  - Dozers
  - Loaders
  - Compactors
  - Trucks
  - Soil Screening Equipment
  - Motor Grader
  - Water Truck

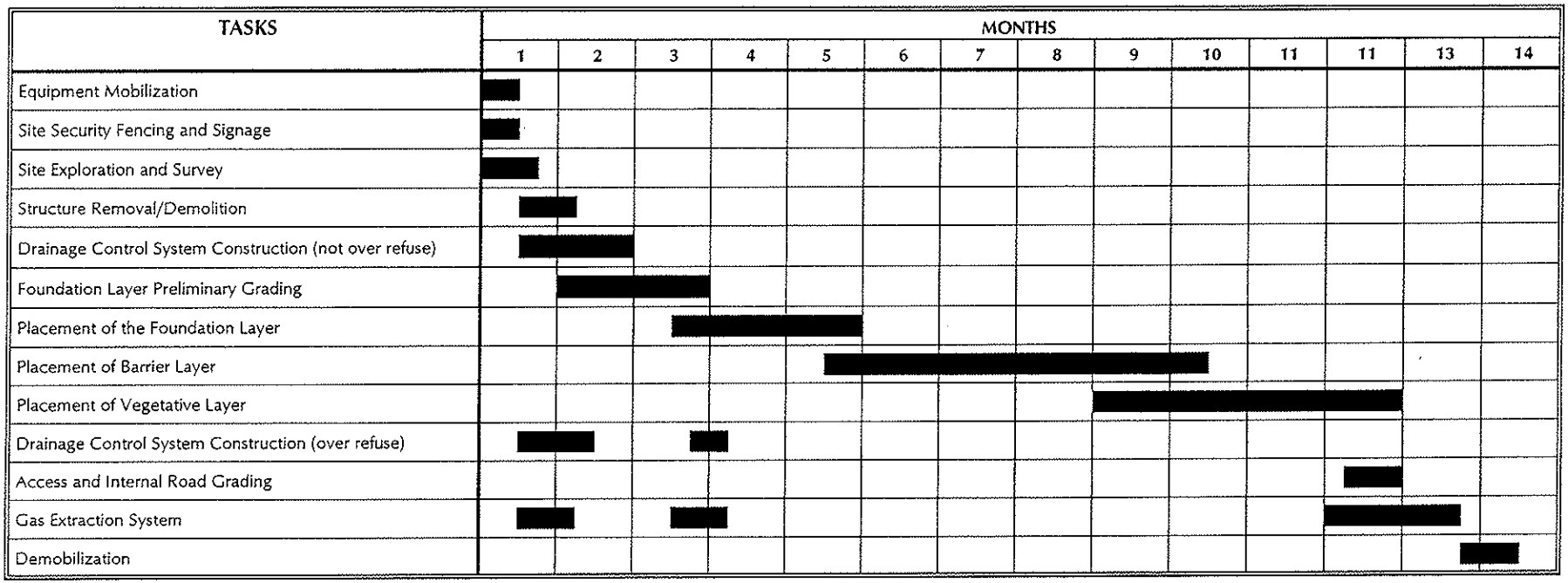
- Personnel
  - Construction Manager
  - Field Inspector(s)
  - Engineer(s)
  - Geotechnical Engineer/Geologist
  - Geotechnical Technician(s)
  - Labor Crews
  - Equipment Operators
  - Surveyors
  - Mechanics

E.1.12.2 CONSTRUCTION SCHEDULE

As required under 40 CFR 258.60, the start of closure construction activities will commence within 30 days after the final shipment of waste.

Closure construction activities will include the following tasks conducted over the corresponding time lines:

TABLE 13
GREGORY CANYON LANDFILL
CLOSURE IMPLEMENTATION SCHEDULE



■ Equipment Mobilization	2 weeks
■ Site Security Fencing and Signage	2 weeks
■ Site Exploration and Survey	3 weeks
■ Structure Removal/Demolition	3 weeks
■ Drainage Control Systems Construction (not over refuse)	6 weeks
■ Foundation Layer Preliminary Grading (including clearing and grubbing)	8 weeks
■ Placement of the Foundation Layer	10 weeks
■ Placement of Barrier Layer	20 weeks
■ Placement of Vegetative Layer	16 weeks
■ Drainage Control Systems Construction (over refuse)	6 weeks
■ Access and Internal Road Grading	3 weeks
■ Gas Extraction System	13 weeks
■ Demobilization	3 weeks

Some of these activities can be conducted concurrently; therefore, closure construction should occur over a period of approximately 14 months as shown on Table 13.

E.1.12.3 CONSTRUCTION MANAGEMENT

A construction manager will be on-site during the entire period of closure construction. The construction manager will be responsible for supervision of construction of the various features included in the closure plan. The construction manager will coordinate the activities of the on-site contractor(s) and will provide liaison among the design engineer and the contractors. Other key staff may include a site engineer and construction inspector(s). A survey crew and a geotechnical CQA crew will also be present, as required.

Survey Control

The survey control crew, under the direction of the selected contractor, will be responsible for the surveyed location of the closure plan improvements and for record drawing information. They will be responsible for establishing that the various components of the cover conform to the grade and/or thickness requirements of the construction drawings and specifications.

CQA For Final Cover Placement

The construction specifications will include a CQA Plan for final cover placement as part of the final closure plan. A geotechnical CQA crew, under the direction of a Geotechnical Engineer, will be on-site full-time during the placement of the final cover to monitor compliance with cover design and installation methods included in the CQA Plan. The CQA personnel will have day-to-day responsibility to oversee cover placement and to evaluate whether the cover is constructed according to the project specifications.

E.1.13 STRUCTURES OUTSIDE PROPERTY BOUNDARIES

In accordance with 27 CCR, Section 21790 (b)(2), a map (Figure 5) has been prepared showing structures on adjacent properties within 1,000 feet of the GCLF property boundary.

SECTION E.2

POST-CLOSURE MAINTENANCE PLAN

E.2 POST-CLOSURE MAINTENANCE PLAN

E.2.1 INTRODUCTION

Post-closure maintenance of the closed GCLF will be performed in accordance with the applicable regulatory standards presented in 27 CCR, Chapters 3 and 4, and 40 CFR Section 258.61. Post-closure maintenance activities for the GCLF will consist of:

- Landfill Gas Migration System Monitoring and Maintenance.
- Groundwater System Monitoring and Maintenance.
- Stormwater Monitoring.
- Final Cover Inspection and Maintenance.
- Settlement Monitoring and Maintenance.
- Vegetative Cover Inspection and Maintenance.
- Main Access Road and Bridge Maintenance.
- Drainage Control System Inspection and Maintenance.
- Site Security Inspection and Maintenance.

E.2.2 RESPONSIBLE PARTIES

The following is a listing of the responsible parties who will be involved in post-closure maintenance and monitoring activities at the GCLF. Questions pertaining to this PCPCMP and associated activities should be directed to the Gregory Canyon Limited contact.

Landfill Owner/Operator

Gregory Canyon Limited
3 Embarcadero Center, Suite 2360
San Francisco, California 94111
Jerry Riessen, General Partner
Telephone No.: (415) 391-2833

A Site Engineer will be responsible for post-closure activities at the GCLF.

Prior to any transfer of ownership during the closure or post-closure maintenance period, responsible parties shall inform the new owner of current regulations, conditions, and agreements assigned to assure compliance.

Additionally, the responsible parties will be responsible of notifying the EA regarding title change within 30 days providing name, firm, mailing address, and telephone number of the new owner in accordance with 27 CCR, Section 21200.

E.2.3 LANDFILL GAS CONTROL AND MIGRATION SYSTEMS MONITORING AND MAINTENANCE

The landfill gas migration monitoring program described in this section provides the procedures proposed to detect migrating landfill gas outside the limits of the landfill.

E.2.3.1 LANDFILL GAS MIGRATION MONITORING PROCEDURES

Monitoring procedures for the gas migration monitoring system will first include inspection of the monitoring probes for visual damage or deficiencies. All probes will be monitored for total hydrocarbons and Total Organic Compounds (TOCs), measured as methane. The monitoring events will be conducted on a quarterly basis, as required by 27 CCR, Section 20933 (a).

At least one void volume will be evacuated from the probe cavity before gas concentrations are measured. The level of total hydrocarbons measured will be obtained by using the following equipment:

- For high-range measurements, a unit capable of measuring 0 to 100 percent by volume will be utilized (e.g., Gas Extraction Monitor [GEM] 500).
- For low-range measurements, a portable Flame Ionization Detector (FID) such as an Organic Vapor Analyzer (OVA) will be used (0-1,000 ppm).

Sample Forms A and B which are to be used by the landfill gas monitoring personnel are included in Appendix O.

E.2.3.2 LANDFILL GAS MIGRATION MONITORING REPORTING

As required by 27 CCR, Section 20934(a), the results of the gas migration monitoring program will be submitted to the EA within 90 days of sampling unless the compliance levels of methane are exceeded. The results will include the concentration of TOCs, measured as methane, in each probe along with information regarding the general conditions under which the sample was obtained. Should the compliance levels be exceeded in any probe, the above-mentioned regulatory agency shall receive verbal notification of the problem within five working days, and indicate what has been done or is planning to be done to resolve the problem. The results will be verified by reviewing the probe readings, possible liquid interference, control well influence, and barometric pressure effects. In accordance with 27 CCR, Section 20937(a)(4), a letter will also be submitted to the EA within ten working days, describing the nature and extent of the problem and the proposed immediate corrective measures that need to be taken to protect public health and safety, and the environment.

E.2.3.3 MAINTENANCE OF LANDFILL GAS MIGRATION MONITORING SYSTEM

The landfill gas control systems will be regularly inspected in conjunction with scheduled monitoring tasks. System components will be repaired and replaced to maintain full system capabilities as intended at initial installation.

Preventative maintenance will be carried out on all mechanical equipment at manufacturer's recommended intervals. This includes cleaning, lubrication, and replacement of worn parts. The accessible portions of gas collection piping will be thoroughly inspected semi-annually for detection of potential failure points and necessary repairs will be noted and implemented.

E.2.3.4 MAINTENANCE OF LANDFILL GAS CONTROL SYSTEM

The following sections cover maintenance requirements for the landfill gas extraction system and associated piping system.

Gas Extraction System

The general maintenance of the landfill gas extraction/control system involves weekly inspections by operating personnel of all wells, pipelines, mainline valves, and mainline sample points.

Operating personnel will be provided with all of the necessary equipment to perform these services. This includes dedicated vehicles, measuring and monitoring equipment, tools and other necessary supplies. An operations log will be kept to provide a continuous record of systems operations. Entries will be made on all routine maintenance activities, emergency repairs, major and minor modifications and adjustments. In addition, all equipment failures, temporary shutdowns, line separations, and blockages will also be documented.

Vertical Gas Extraction Well Maintenance

One of the principal problems affecting vertical wells is breakage or shearing of the well casing caused by settlement or subsidence of the landfill. Damage by heavy equipment can also occur.

Even if a vertical well is broken or sheared, it may not reduce the well performance relative to gas extraction. The well bore and down hole piping may continue to provide a functional conduit for gas extraction. The historic flow characteristics of each well will enable the operator to determine when a sudden drop occurs, indicating a new well may be required.

Another problem encountered in vertical well systems is the settlement of the landfill around the well casing. As settlement occurs, periodic adjustment of the well casing will be required.

If a problem is discovered with a gas well, the following maintenance procedures will be initiated.

- The damaged well or well to be adjusted to grade will be isolated from the gas collection lateral to avoid excess dilution of the gas in the header with outside air.

- Necessary replacement parts will be installed or the well will be adjusted to grade as required.
- The well will then be reconnected to the lateral and returned to service.

All necessary maintenance and/or repairs will be documented using the sample form included as Figure 33.

Vertical Gas Extraction Well Replacement

Drilling

- Gas extraction wells may be redrilled or replaced for various reasons. The following are the most common:
  - The well may be rendered useless due to high temperatures or subsurface fires.
  - The well may be sheared off underground due to landfill subsidence and settlement.
  - The well may be a low producer of landfill gas because of plugged perforations in the casing.
  - Additional coverage in an area is required and more wells are necessary.

- Procedures for redrilling, adding or replacing a gas well are as follows:
  - Choosing the location will be based upon the need for environmental emissions control.
  - The vegetation cover material will be excavated and the synthetic barrier layer cut in the area for drilling. Once the well has been installed, a synthetic boot will be slipped over the well head and then welded to the surrounding synthetic barrier layer. The vegetative material will then be back filled and compacted to 90% relative density. All cover penetration and repair activities will be conducted in accordance with the approved QA/QC Plan developed as part of the final closure plan.
  - The drill rig will be set up on the location chosen by Gregory Canyon Limited. The drilling procedure will meet all regulatory requirements.
  - The well design casing diameter, perforations, gravel packs, borehole diameter, and well seals will be selected by Gregory Canyon Limited.
  - The maintenance crew will construct the proper bentonite seal and install the valve vault.
  - The crew will also connect the well to the gas collection lateral.

Abandonment

- When abandoning the well, the following procedures will be followed:
  - The annular space of the well will be filled with sand to 25 feet below ground surface.
  - An attempt will be made to pull the top joint of the well casing. If this cannot be accomplished, dirt will be removed around the casing to a depth of three feet and the casing cut.
  - The annular space of the well will be filled from 25 feet below grade to ground surface with natural sodium bentonite chips. The well will then be filled with clean water.
  - The area will then be covered with final cover.

- Well abandonment procedures will be recorded on a form as shown in Figure 34.

Piping System

Identification of operational problems in the piping systems requires consistent monitoring. Well connector pipes may break or separate from the gas lateral; control valves may fail, clog or lose adjustment and need to be readjusted; horizontal collectors may become disconnected and liquid accumulation in headers or drains may cause blockage or restrictions.

Gas collection header and condensate drain line inspections will be part of the routine post-closure maintenance operations. The pipelines will be exposed to landfill settlement and movement, construction activities and heavy equipment operations.

Vacuum leaks may cause odors and/or an audible hissing sound. Pipeline breaks or separations, if not discovered in normal field inspections, will produce secondary effects which are easily diagnosed. For example, methane concentrations drop as the oxygen content of the collected gas increases due to air intrusion. Broken or damaged piping will be replaced after the section has been isolated from the rest of the system.

Any pipeline maintenance conducted will be recorded on the form as shown in Figure 35.

Well Head Connection

The gas well head connections are also susceptible to landfill settlement. If the header connection to the well does not allow for flexibility, then a rupture or crack could occur allowing outside air to dilute the gas in the header and diminish the well's performance. This maintenance problem which can be costly in repairs and down time, will be minimized by the use of a high-strength, silicone rubber, flexible coupling. The coupling will be chemically compatible with the landfill gases and will allow differential settlement between well head and lateral piping.

Maintenance Schedule

The majority of the components of the landfill gas control system will be inspected on a quarterly basis. Maintenance for these systems is as required and as described in this section.

A full stock of spare parts will be kept at GCLF which will allow for timely repairs and/or replacements of components such as piping, valves, fittings, etc. Table 14 shows the schedule on the frequency of inspection and maintenance to be performed on the gas control system.

E.2.4 SURFACE EMISSIONS MONITORING PROCEDURES

The surface emissions monitoring program described in this section gives the methods and procedures required to monitor the effectiveness of controlling migrating landfill gas through the final cover in accordance with SDAPCD Rule 59.

The landfill gas control system is the primary mechanism for controlling surface gas emissions. The air monitoring procedures outlined below are to comply with SDAPCD surface emissions standards.

E.2.4.1 INSTANTANEOUS SURFACE EMISSIONS SAMPLING

Instantaneous sampling of the surface of the landfill will be collected over the entire landfill area utilizing a grid system that will be developed. This sampling

TABLE 14
GREGORY CANYON LANDFILL
POST-CLOSURE MAINTENANCE SCHEDULE

MAINTENANCE ACTIVITY	FREQUENCY
FINAL COVER MAINTENANCE	
A. Inspection	Quarterly
B. Repair	As-Required
MAIN ACCESS ROAD AND BRIDGE	
A. Inspection	Quarterly
B. Repair	As-Required
DRAINAGE FACILITIES MAINTENANCE	
A. Bench Drains & Inlet Structures	Quarterly
B. Downdrain Systems	Quarterly
C. Deck Drainage System	Quarterly
D. Asphalt Drainage Channels, Pipes and Ditches	As-Required
E. Detention Basin	Quarterly
LANDFILL GAS RECOVERY SYSTEM MAINTENANCE	
A. Gas Extraction Well Maintenance	Quarterly
B. Gas Extraction Well Replacement	As-Required
C. Piping System	Quarterly
D. Condensate Conveyance Lines and Collection Tanks	Quarterly
E. Flare Station	Annually or as required
GAS MIGRATION CONTROL/MONITORING SYSTEM MAINTENANCE	
A. Inspection	Quarterly
B. Maintenance	As-Required
LANDSCAPE AND IRRIGATION MAINTENANCE	
A. Weed Control	Semi-Annual or as required
B. Rodent Control	Annually or as required
C. Reseeding and Mulching	Semi-Annual
SURVEY MONUMENTATION MAINTENANCE	
A. Disposal Area Monuments	Annually
FENCE MAINTENANCE	
A. Inspection	Quarterly
B. Maintenance and Repair	Quarterly or as-required
GROUNDWATER MONITORING SYSTEM AND MAINTENANCE	
A. Inspection	Quarterly
B. Well Maintenance	As-Required
C. Well Replacement	As-Required

will identify specific locations where excessive landfill gas emissions are occurring and where repair of the final cover may be required.

The objectives of the surface sampling is to identify specific areas where surface gas emissions exceed 500 ppm by volume expressed as methane as required by SDAPCD and to measure the effective operation of the gas collection system and final cover.

E.2.4.2 AMBIENT AIR SAMPLES AT THE PERIMETER OF THE SITE

Ambient air samples will be collected inside the refuse footprint area within 10-feet of the landfill perimeter on days when meteorological conditions are representative for the locations of known downslope wind drainage. Sampling will not be conducted when it is raining or when average wind speeds are greater than 15 miles per hour for any 30 minute period or when the instantaneous wind speed is greater that 25 miles per hour. These samples will be collected seasonally during stable meteorological conditions for the winter and summer seasons. All samples will be analyzed for total organic compounds, toxic air contaminants and criteria pollutants except ozone emitted to the atmosphere required by SDAPCD.

E.2.5 WATER QUALITY MONITORING SYSTEM AND MAINTENANCE

The monitoring program that will be instituted at the GCLF is designed to detect potential migration of contaminants from the landfill. The monitoring program for the GCLF will be performed in accordance with 27 CCR, Chapter 3, Subchapter 3. The water quality monitoring program will be conducted throughout the 30-year post-closure maintenance period following site closure.

E.2.5.1 GROUNDWATER MONITORING PROCEDURES

The groundwater monitoring system at the GCLF is described in Section B.5.1.3. Article 1 groundwater monitoring costs are included in the post-closure cost estimate. However, any future corrective action program or capital improvement costs will be covered under a separate account maintained by Gregory Canyon Limited.

It is expected that modifications to program frequency and protocols will take place depending upon changing conditions, and the results of monitoring and improved technologies. This Plan will be amended to include any changes in the monitoring program or modifications to the system, including the installation of any proposed remediation systems.

E.2.5.2 GROUNDWATER MONITORING REPORTING

Monitoring will be performed in accordance with 27 CCR, Chapter 3, Subchapter 3, Article 1. Sample collection, storage and analysis will be performed in accordance with the most recent version of Standard USEPA Methods and in accordance with the most current M&RP (Appendix G) approved by the RWQCB.

All samples will be analyzed on a quarterly basis for routine monitoring parameters and VOCs. Constituents of Concern (COC) monitoring will be performed every five years in accordance with 27 CCR, Chapter 3, Subchapter 2. The COC report may be combined with any monitoring report or the annual summary report having a reporting period that ends at the same time.

E.2.5.3 GROUNDWATER MONITORING SYSTEMS MAINTENANCE

The groundwater monitoring wells will be serviced and maintained to allow the wells to perform to the standards for which they were designed. Monitoring wells will be inspected prior to each monitoring event to determine if the well has been tampered with or damaged. All necessary maintenance and/or repairs for wells are to be documented using a form similar to sample Form C included in Appendix O.

If a monitoring well is damaged, it may need to be repaired or replaced using a method approved by the RWQCB. The Site Engineer will oversee the well replacement process including abandonment (if necessary) as well as coordination with the RWQCB.

If a groundwater monitoring well becomes unusable or irreparable, it will be abandoned following RWQCB procedures, San Diego County Department of

Environmental Health Services regulations and the most current guidelines in the "California Well Standards: California Department of Water Resources" (DWR Bulletin 74-90).

E.2.6 WATER TREATMENT SYSTEM MAINTENANCE

The RO system or GAC (if installed) will be maintained routinely. All filtration elements will be changed on a regular schedule depending on the ultimate water inflow rate. Residual sludges will be disposed off-site to an approved facility.

E.2.7 STORMWATER MONITORING

A stormwater monitoring program was developed for the GCLF in accordance with the General Permits to Discharge Stormwater (i.e., construction and industrial) administered by the RWQCB in compliance with NPDES regulations. The program includes specific procedures for inspection, sampling, observations and reporting. A SWPPP was prepared and will be amended, as necessary, to reflect any changes in operation and design as a result of ongoing or closure operations. The SWPPP and the MPRR are included in Appendix D.

E.2.8 FINAL COVER INSPECTION AND MAINTENANCE

The purpose of the completed final cover is to:

- Minimize stormwater infiltration into and through the closed landfill,
- Minimize the venting of gas generated in the facility,
- Isolate the buried wastes from the surface,
- Promote drainage,
- Minimize erosion or abrasion of the cover, and
- Accommodate settlement and subsidence so that cover integrity is maintained.

The primary purpose of the final cover maintenance procedures is to maintain the integrity of the completed final cover over the long-term and provide maintenance, scheduling and documentation so that materials and maintenance

practices are consistent with the final cover design specifications. Quarterly visual inspections of the final cover will include identification of erosion and settlement problems.

The Site Engineer will be responsible for documenting the location and extent of any repairs.

E.2.8.1 INSPECTION PROCEDURES

All employees with access to the site will be instructed to report any final cover surface cracking, ponding or unusual surface conditions to the Site Engineer, who will record the information in the site logbook at the time they are observed. Scheduled, formal inspections will be performed on a quarterly basis by grid walking the site to visually observe the following:

- Evidence of erosion
- Visible depressions
- Ponded water
- Odor
- Exposed refuse
- Cracks
- Settlement and subsidence
- Slope failure
- Leachate seeps

Additionally, the drainage control facilities will also be inspected quarterly, as described in Section E.2.12, for improper operation and resultant effects on the surrounding final cover.

A formal report of findings is to be presented to the Site Engineer. This report will be reviewed with Gregory Canyon Limited and the report will be maintained at the record library.

E.2.8.2 MAINTENANCE PROCEDURES

The final cover design for the GCLF consists of a minimum 24-inch foundation layer, 60-mil LLDPE geocomposite barrier layer, including a geonet with a non-woven geotextile on each side for the deck areas, and a 24-inch vegetative layer. Figure 30 shows a typical cross-section of the final cover system design.

All final cover repair and/or reconstruction activities shall be conducted in a manner directed at maintaining the integrity of the as-built final cover system. Repair of fill materials should be performed in six to eight-inch layers consistent with the layers and procedures utilized during the original final cover construction. Additionally, the repair of the geosynthetic cover will also be consistent with the procedures used during initial installation.

The methods of repair discussed in the subsequent paragraphs are recommended for the following three modes of final cover distress:

- Penetration into or through the final cover associated with any installation or maintenance of gas or groundwater system components.
- Settlement related sags and drainage interruptions, which interfere with the controlled flow and discharge of surface waters from the closed landfill surface.
- Surface erosion associated with intense rains.

Final cover repair activities will be conducted and documented as specified in the CQA Plan (Appendix M). In addition, any repair involving removal of the synthetic cover must be approved by the Site Engineer and the synthetic cover installer must be contacted to cut and subsequently patch and seal the synthetics. The CQA inspector shall observe all fill placed in the foundation or low-permeability zones of layered systems and all geosynthetics installed.

Elective Penetration

Elective penetration of the final cover associated with installation or maintenance of gas or groundwater monitoring system components should be initiated in coordination and with the approval of the Site Engineer. All earthwork should be

completed in accordance with the procedures contained in the CQA Plan (Appendix M).

Care should be taken during excavation not to damage the geosynthetic cover beyond which is reasonably necessary. Damaged synthetics will need to be replaced with new material placed and overlapped, in accordance with the CQA.

For boring excavations, the annular space between the well casing and the boring wall will be backfilled with final cover fill material and tamped to achieve specified compaction.

Sags, Ponding, Drainage Interruptions and/or Surface Erosion

Any repair of significant depressions in the final cover will be completed in the landfill area immediately prior to the rainy season (November to April). If significant sags or depressions are identified during other times of the year, the Site Engineer will accurately locate the limits of the depressions both horizontally and vertically.

A channel capable of draining the lowest point of the sag may be constructed if ponding is anticipated for a prolonged period. Additional soils can also be placed so that the intended flow of surface water is re-established. The Site Engineer will be responsible for directing fill placement in the sag area only in order to facilitate drainage. Record of the depths and limits of fill placement will be maintained.

In addition, if post-closure maintenance to the final cover necessitates stripping of the vegetative cover to make repairs, only the affected area would be redirected to the buried storm pipe again until the native vegetation condition criteria is achieved.

E.2.9 LANDFILL SETTLEMENT MONITORING AND MONUMENT MAINTENANCE

E.2.9.1 SURVEY RECORD

Regulatory requirements dictate that, upon completion of closure construction

activities, a survey record of the closed landfill be established and recorded with the title of the property, with the County Recorders office and copies be made available to the CIWMB, LEA and kept on-site at the administration offices. The survey of record will include the following information:

- The date closure construction was completed;
- Boundaries of the disposal area;
- The location and telephone number of where the closure and post-closure plans can be obtained; and
- A statement that the future site use is restricted in accordance with the post-closure maintenance plan.

A discussion of the site's operating record requirements is included in Section A.3.1.

E.2.9.2 SURVEY/SETTLEMENT MONUMENTS

In accordance with 27 CCR, Section 20950 (d), survey/settlement monuments are to be established at the landfill so that facilities constructed during closure can be located and controls can be provided from which to monitor future landfill settlement. After completion of the final cover, settlement monuments will be set on the landfill in the disposal area as shown on Figure 9. These monuments will be used to monitor settlement within the closed landfill and will allow for a determination of the actual settlement that occurs over the post-closure maintenance period.

Additionally, 27 CCR, Section 21090 (e)(2) requires operators to produce iso-settlement maps every five years throughout the post-closure maintenance period or until settlement has ceased. Prior to an aerial survey, the monuments will be surveyed for horizontal and vertical control so that an accurate disposal area topographic map can be developed. Aerial "targets" will be placed over these monuments after the survey has been completed and an aerial topographic map will be generated to provide an up-to-date contour map of the disposal area.

Prior to a scheduled survey of the monuments, an inspection will be performed to ensure that the monuments are intact and usable. The monument will be cleared of all debris and vegetation to allow for visual location of the monument

and accurate readings. Should a monument be damaged or missing, a new monument will be placed at that location so that the continuity of the previous survey data will be maintained.

If a monument is within an area requiring regrading and/or other reconstruction, it shall be replaced at approximately the same horizontal location and a note shall be placed to identify the new elevation.

E.2.10 VEGETATIVE COVER INSPECTION AND MAINTENANCE

The GCLF vegetative cover is designed to provide year round non-irrigated open space erosion control. This PCPCMP describes the vegetative cover maintenance procedures to be implemented upon closure and conducted throughout the post-closure period. The cover will be established as a grassland and partial inland valley sage plant community. Long-term succession and establishment of the plant material will simulate the natural cycles and appearance of the adjacent open space areas.

A total of three post-closure activities are identified as integral to the maintenance of the vegetative cover. These activities include weed control, rodent control, and reseeding.

Weed Control

The intent of the weed control program is to properly identify weeds or other plant materials unsuitable for erosion control and/or unsuitable for the establishment of the final cover system. Problematic weeds may be prone to invasiveness, unsightliness, fire, and may possess root systems too deep for the final cover. Monitoring activities should occur semi-annually during and following the winter rain cycle and should identify new growth of problematic weeds. Once problematic weeds are identified, eradication methods should occur prior to seed production. Recommended eradication methods include hand removal and/or biologically friendly chemical control/removal.

Rodent Control

Rodent burrowing could potentially damage the vegetative layer of the final cover. However, a large rodent population is not expected at the GCLF and rodent activity should remain at harmless levels since the native vegetation does not offer excessive food availability or shelter from natural predators. Monitoring of rodent activity will occur in the spring months when food is most available. Rodent control measures will be implemented, as needed, as discussed in Section B.5.3.2.

Reseeding and Mulching

As post-closure activities and operations are performed, the vegetative cover may be damaged or removed. At these times, reseeding will be necessary to maintain adequate erosion control. All reseeding should conform to Final Closure landscape specifications. Hydro-mulching would be performed on areas too steep or too large for drill or hand-seeding. Drill-seeding would be utilized in large, flat areas. A hand-held "whirly-bird" spreader followed by hand-raking would be the recommended form of seed application for smaller areas (approximately one acre).

E.2.11 MAIN ACCESS ROAD AND BRIDGE MAINTENANCE

The main access road and bridge will require general maintenance. After a significant storm event and on a quarterly basis, the access roads and bridge will be inspected to determine if any potholing, erosion and/or structural damage has occurred. If any deficiencies are noted, the affected area will be repaired. AC roadways will also be inspected quarterly and will be resurfaced every five years, as necessary. Major bridge repairs may be made by an outside contractor selected by Gregory Canyon Limited.

E.2.12 DRAINAGE CONTROL SYSTEM INSPECTION AND MAINTENANCE

The following sections delineate the various maintenance activities to be performed on the landfill drainage control facilities for the site.

After the drainage control system has been in service for several years, a more definitive inspection and maintenance schedule can be developed identifying those areas that must be inspected annually and those areas that must be inspected prior to and after a storm and those areas that require maintenance before the wet season.

E.2.12.1 DECK DRAINAGE CONTROL SYSTEM FEATURES MAINTENANCE

Inspection for proper deck surface drainage will be performed in conjunction with the final cover procedures described in Section E.2.8. It is important that maintenance vehicles utilize access roads provided on the decks and benches whenever possible to reduced surface rutting which could interfere with the designed drainage patterns.

E.2.12.2 DOWNDRAINS, DRAINAGE PIPES AND CHANNELS AND DITCHES

A visual inspection of each open channel and downdrain will be conducted to identify any of the following deficiencies:

- Cracking
- Settlement
- Spalling

The following corrective measures can be taken for deficiencies identified during the inspection.

Cracking

- Construction of expansion/control joints.
- Resurface.

Settlement

- Grout injection.
- Complete replacement with subgrade rework.

Spalling

- Sandblast affected area and resurface.
- Sawcut and remove affected area, dowel into existing undamaged section and resurface.

E.2.12.3 OVERALL DRAINAGE CONTROL SYSTEM MAINTENANCE SCHEDULE

The on-site drainage control facilities must be free of debris and operational at all times. In order to provide the desired protection against flooding and erosion damage, routine inspections of the drainage control system will be conducted. A written report will be prepared for all scheduled inspections and will be kept on file with the Site Engineer. In addition, all inspection forms will be maintained in the operating record file as required by 40 CFR, 258.29. Form E included in Appendix O is a standard inspection form which can be used for this purpose.

E.2.13 SITE SECURITY INSPECTION AND MAINTENANCE

Security fencing, access gates and signs will be inspected quarterly to ensure that the integrity of site security has been maintained. The gates will be inspected to check that the locking mechanisms are intact and workable. Any necessary repairs or replacements will be made during the quarterly inspection.

E.2.14 EQUIPMENT, LABOR AND MATERIAL REQUIREMENTS

E.2.14.1 EQUIPMENT

The equipment schedule presented in Table 15 delineates the specific type of equipment, instruments and tools expected to be used for post-closure maintenance. Any required equipment, not kept on-site, will be rented on an "as needed" basis.

E.2.14.2 LABOR

The work force necessary to monitor and maintain the GCLF during post-closure will be directed and coordinated by a designated Site Engineer. There will be independent staff assigned to each of the following activities:

- Final cover, drainage and general maintenance
- Environmental monitoring and reporting

The maintenance and monitoring personnel will be under the direction of a Site Engineer. Any additional personnel needed for maintenance activities such as surveying or drilling will be provided through the use of outside contractors.

The projected maintenance schedule for each of the post-closure activities is shown on Table 14. The primary purpose of this schedule is to identify the frequency of mandatory inspections for the various systems. The frequency of monitoring the gas migration system, sampling and analysis for the groundwater/vadose zone and survey of the settlement monuments will be in accordance with the monitoring schedule presented in Table 16.

TABLE 15
GREGORY CANYON LANDFILL
POST-CLOSURE EQUIPMENT SCHEDULE

EQUIPMENT REQUIREMENTS	Small Dozer	Dump Truck	Motor Grader	Backhoe w/ Bucket Loader	Compactor	Sheepsfoot Compactor	Tampers	Water Truck	Vacuum Truck	Pickup Truck	Flatbed Truck	Boom Truck	Portable Generator	Air Compressor	Concrete Mixer	Sand Blasting Unit	Hydro-mulching Machine	Grouting Equipment	Transfer Pumps
Final Cover Maintenance																			
Inspection																			
Repair																			
Drainage Facilities Maintenance																			
Bench Drains and Inlet Structures																			
Down Drain Systems																			
Deck Drainage System																			
Concrete Drainage Channels																			
Liquids Management System Maintenance																			
Pumps																			
Sumps and Storage Tanks																			
Condensate Drain Line																			
Transfer Pump and Pipeline																			
Drain Line																			
Landfill Gas Recovery System Maintenance																			
Gas Extraction Well Maintenance																			
Gas Extraction Well Replacement																			
Piping System																			
Gas Flares																			
Blowers																			
Gas Migration Control System Maintenance																			
Perimeter Probes																			
Perimeter Wells																			
Piping System																			
Landscape and Irrigation Maintenance																			
Weed Control																			
Rodent Control																			
Reseeding and Mulching																			
Survey Monumentation Maintenance																			
Disposal Area Monuments																			
Perimeter Fence Maintenance																			
Fence Maintenance and Repair																			
Groundwater Monitoring																			
Well Maintenance																			
Well Replacement																			
Article 1 Monitoring																			
Gas Recovery System Monitoring																			
Gas Migration Control System Monitoring																			
Surface Emissions Monitoring																			

TABLE 15
GREGORY CANYON LANDFILL
POST-CLOSURE EQUIPMENT SCHEDULE

	Well Pumps	Drill Rig	Sounding Device	Groundwater Sampling Equipment	Pump Truck	Tooling Truck	Cuttings Container	Welding Equipment	Cable Pullers	Winches	Waterjet Spray Unit	Bucket Line Machine	Fire Hydrant Hose	Nozzles	Gas Sampling Equipment	Surface Sampling Equipment	OVA Meters	Gas Chroma-tography	Blowers for Ventilation	Safety Equipment	Respiratory Equipment
EQUIPMENT REQUIREMENTS																					
Final Cover Maintenance																					
Inspection																					
Repair																					
Drainage Facilities Maintenance																					
Bench Drains and Inlet Structures																					
Down Drain Systems																					
Deck Drainage System																					
Concrete Drainage Channels, Pipes and Ditches																					
Liquids Management System Maintenance																					
Pumps																					
Sumps and Storage Tanks																					
Spring Seepage Control System																					
Condensate Drain Line																					
Transfer Pump and Pipeline																					
Drain Line																					
Landfill Gas Recovery System Maintenance																					
Gas Extraction Well Maintenance																					
Gas Extraction Well Replacement																					
Piping System																					
Gas Flares																					
Blowers																					
Gas Migration Control System Maintenance																					
Perimeter Probes																					
Perimeter Wells																					
Piping System																					
Landscape and Irrigation Maintenance																					
Weed Control																					
Rodent Control																					
Reseeding and Mulching																					
Survey Monumentation Maintenance																					
Disposal Area Monuments																					
Perimeter Fence Maintenance																					
Fence Maintenance and Repair																					
Groundwater Monitoring																					
Well Maintenance																					
Well Replacement																					
Article 7 Monitoring																					
Gas Recovery System Monitoring																					
Gas Migration Control System Monitoring																					
Surface Emissions Monitoring																					

TABLE 16
GREGORY CANYON LANDFILL
POST-CLOSURE MONITORING SCHEDULE

MONITORING ACTIVITY	FREQUENCY
ARTICLE 1 MONITORING	
A. Leachate/Groundwater Sampling	Quarterly
B. Constituents of Concern Monitoring	Every 5 years
C. Groundwater Elevation/Flow Rate/Direction	Every 5 years
D. Surface Water Monitoring	Quarterly
GAS RECOVERY SYSTEM MONITORING	
A. Collection Headers	Quarterly
B. Wells	Quarterly
C. Sampling Gas in Collection Headers and Probes	Quarterly
GAS MIGRATION CONTROL SYSTEMS MONITORING	
A. Perimeter Probes	Quarterly
D. Structures	Quarterly
SURFACE EMISSIONS MONITORING	
A. Integrated Surface Emissions (50 PPM Rule)	Annually
B. Visual Inspection of Landfill Surfaces	Monthly
C. Ambient Air Samples at Perimeter of the Site	Annually
SURVEY MONUMENTS	
A. Aerial Survey	Every 5 years

SECTION E.3

POST-CLOSURE EMERGENCY RESPONSE PLAN

E.3 POST-CLOSURE EMERGENCY RESPONSE PLAN

E.3.1 PURPOSE AND SCOPE

This Emergency Response Plan (ERP) was prepared in accordance with 27 CCR, Sections 21130 and 21132, as part of the GCLF PCPCMP. The ERP identifies occurrences that may exceed the design of the site and endanger public health or the environment. The ERP also sets forth actions which will minimize the effects of these catastrophic events. The provisions of this ERP will be carried out immediately whenever an event occurs such as a fire, explosion, flood, earthquake, vandalism, surface drainage problems or release of any waste product which may threaten public health and/or the environment.

E.3.2 SITE SAFETY OFFICER

The Site Manager will have the responsibility of the Site Safety Officer (SSO). An alternate will also be designated by both of these individuals. The SSO and alternate will be trained to handle all emergency situations. The main responsibility of the SSO is to oversee the management of all emergency response procedures implemented at the landfill. The SSO is required to be thoroughly familiar with all aspects of the ERP as well as the waste containment system features, environmental control systems, post-closure maintenance activities, the location and characteristics of buried refuse, the location of facility records and the overall site layout. In addition, the SSO shall be given the authority to commit any of the available resources necessary to carry out the ERP. Qualifications of the SSO and alternate will include general safety training, hazardous communication training, and hazardous materials recognition training.

E.3.3 EMERGENCY RESPONSE NOTIFICATION PROCEDURE

When any member of the site's maintenance personnel discover or witness an event which constitutes an emergency situation they shall determine the nature, source, and location of the emergency situation and immediately report the occurrence to the Site Engineer, who will notify the SSO. The SSO will notify all of the appropriate emergency response agencies to provide assistance to site

personnel. If an emergency event occurs when field personnel are not on-site, the general public will be able to call the telephone number posted on a sign at the site entrance to notify the SSO.

E.3.4 EMERGENCY RESPONSE PROCEDURES

General emergency response procedures for fire, explosions, earthquakes, floods, vandalism, release of waste products to air and soil, or surface drainage problems, are described below.

- Remove all non-essential employees from the vicinity of the incident.
- Remove non-essential equipment, if it can be done safely, from the vicinity of the incident.
- Determine and identify the nearest source of available equipment and supplies for responding to the incident.
- When practicable, the SSO may utilize on-site personnel to control the incident.
- The Site Engineer or his designee will be responsible for site personnel safety. The Site Engineer will communicate any damage and/or injury reports to the SSO and will coordinate all emergency actions directed by the SSO.
- Site personnel will be available for inspection of the landfill after an incident occurs. All crew members will be supplied with appropriate personal protective clothing, as required by the SSO, when conducting inspections of the site for possible design failure. All findings will be reported to the SSO for action.
- The SSO will immediately begin surveillance in those areas of the facility affected by the incident. In addition, monitoring will be conducted to prevent an incident from affecting other areas of the facility or adjacent properties.
- The operator will maintain a small stockpile of final cover material for those events which may require immediate cover placement to minimize waste releases, to repair severe cracks, or to fill in large erosion gullies.

The type of equipment and materials that should be available for emergencies include a cellular phone, first aid kit, air supplies, fire extinguisher, final cover material, and sandbags.

E.3.5 FIRE AND/OR EXPLOSIONS

The following procedures will be followed during incidents of fire and/or explosions:

- Contact the local Fire Department, even if on-site capabilities are deemed adequate to extinguish fires or control future explosions. On-site landfill personnel will be instructed to follow the fire department's directions and give their full cooperation.
- In the event of an off-site fire near the landfill, such as a structural fire, the operator will lend its personnel and equipment, if available, to the Fire Department to fight the fire.

E.3.6 FLOOD

The landfill footprint and borrow/stockpile areas are not located within the designated boundaries of a 100-year floodplain. The access road/bridge would be located within the designated boundaries of the 100-year and 500-year floodplains. However, the lowest elevation of the access road/bridge would be 312.0 while the 100-year floodplain at the upstream is 310.7 feet. Therefore, the access road/bridge is designed to be above the highest record elevation of the 100-year floodplain so that no significant flooding impacts would occur during operations. The landfill perimeter drainage network would collect all surface drainage entering onto the site. Surface water run-on would then be directed to the on-site desilting basins.

The following procedures will be followed if flood waters occur at the GCLF in excess of the handling capability of the stormwater control system:

- Earthen berms may be constructed in areas prone to flooding.
- If berming is ineffective, the operator may cut a diversion channel to avoid inundation of the refuse cell.
- Sand bags may be used in conjunction with berms or diversion channels.

E.3.7 EARTHQUAKE

The following procedures will be performed following an earthquake incident:

- Employees driving in the field during an earthquake should stop their vehicle and get out, if it can be done in a safe manner.
- After the earthquake has subsided, site personnel shall report to the site entrance gate for a roll call. If medical care is required, the procedures in Section E.3.13 shall be followed. An inspection of the site shall then be made and a report given to the SSO.
- Cracks observed in the final cover after an earthquake should be inspected with a combustible gas analyzer. The location of venting and the gas concentrations will be determined and reported to the SSO. Excavation and refill of the smaller surface cracks will be completed immediately. More extensive corrective actions will be authorized by the Site Engineer in accordance with a CQA Plan.

E.3.8 SURFACE DRAINAGE PROBLEMS

In the event of a surface drainage problem, the following procedures shall be followed:

- The operator will investigate the problem and determine a necessary course of action.
- If a surface inlet is blocked with debris, all necessary labor forces and equipment will be implemented under the direction of the operator to remove the blockage.
- If a storm drain is damaged, a plan will be prepared and implemented by the operator to repair the problem.
- After the drainage problem is corrected, an assessment of possible damage or erosion will be conducted and all necessary repairs will be made.

E.3.9 VANDALISM

The following procedures will be followed during incidents of vandalism:

- Repair (i.e., replace, repaint) any portion of the property which has been vandalized.

- Immediately repair any vandalism which affects site security and/or environmental control/monitoring systems.

E.3.10 UNDERGROUND FIRES

Underground landfill fires or elevated subsurface temperatures occur due to air intrusion into the refuse cell. Indicators of this condition are as follows:

- Unusual depression-like settlement with tension cracks.
- Smoke/steam.
- Unusual odor.
- High levels of carbon monoxide.

Should any of the above indicators be noted, the first course of action would be placement of soil to cover the depression and/or cracks. If this measure does not correct the problem, additional measures may be taken under the direction of the SSO and/or operator.

E.3.11 EMERGENCY RESPONSE PLAN ORIENTATION

Contacts should be made with appropriate emergency response agency representatives and the following information should be conveyed:

- Familiarize them with the layout of the facility, the properties of the waste materials deposited, and the evacuation routes.
- Establish understandings between the responding Police/Sheriff and Fire Departments and designate which agency has primary emergency authority during an incident.
- Establish understandings between emergency response teams, emergency response contractors, and equipment suppliers for smooth coordination of emergency response actions.

E.3.12 EVACUATION PROCEDURES

During and/or after an incident, the SSO in consultation with other emergency personnel, such as the fire department, will assess the potential for injury to any persons located on adjacent properties. If the assessment concludes that an

imminent threat to public health is possible, an evacuation of the nearby area will be initiated. Situations which warrant partial or complete evacuation of site personnel and/or local residents are as follows:

- Explosions resulting in airborne debris including particles and large fragments.
- Fires that cannot be readily contained or are spreading to other parts of the facility; or when fire could generate highly toxic fumes, or create a danger of igniting potentially explosive substances which may be stored on-site.

The SSO will immediately notify the Sheriff Department and all other appropriate emergency response agencies. The SSO will check that the entrance gate is unlocked and resecured as required.

E.3.13 MEDICAL CARE PROCEDURES

Should an emergency situation result in personal injury, immediate steps will be taken to determine the cause and extent of the injury and to render first aid. The SSO will be notified in all cases and the paramedics will be called when required. If further medical attention is necessary, the injured person will be transported to the nearest medical facility.

E.3.14 AMENDMENTS TO THE EMERGENCY RESPONSE PLAN

The ERP will be reviewed and can be amended, in accordance with the criteria listed in 27 CCR, Section 21130(c). The amendment criteria are as follows:

- A failure or release occurs for which the plan did not provide an appropriate response.
- The post-closure use and/or structures on the site change and these changes are not addressed in the existing plan.
- The EA, the RWQCB or the CIWMB notifies the operator in writing that the current emergency response plan is inadequate under the provisions of this section. The notifying agency shall include within the written notice those items that must be considered for the plan to be in compliance with this section. The operator shall submit an amended ERP to the EA, the RWQCB and the CIWMB within 30 days of receipt of notification that the plan is inadequate.

Whenever the ERP is amended, a written copy will be submitted to the EA, the RWQCB and the CIWMB. Finally, procedures similar to those outlined in this ERP will be applied to emergency events occurring during active operations prior to closure and post-closure maintenance of the GCLF.

SECTION E.4

PROFESSIONAL CERTIFICATION OF ACCURACY

E.4 PROFESSIONAL CERTIFICATION OF ACCURACY

Current regulations require that a registered civil engineer or a certified engineering geologist prepare and certify the accuracy of closure plans for all Class III landfills. The Gregory Canyon Landfill Preliminary Closure/Post-Closure Maintenance Plan has been prepared in accordance with 27 CCR, Chapters 3 and 4 and 40 CFR, Part 258 as certified by Mr. Bryan A. Stirrat, a California Registered Civil Engineer, Registration Number C 22631.

Respectfully Submitted:

Bryan A. Stirrat, P.E.
R.C.E. No. C 22631